

e-Manufacturing & Design Collaboration Symposium 2018

Invited Speech:

Applying Smart Manufacturing and Machine Learning Methods Across Global Semiconductor Ecosystems



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About the Speaker

Dr. Paul Simon is Co-founder and Executive Vice President at Qualtera, running marketing and business operations in Asia. Serving 20 years in several senior positions in yield, product and test engineering management at Philips Semiconductors, NXP and PDF Solutions, Dr. Simon holds an M.S. and a Ph.D. degree in DFM and semiconductor yield modeling.

QUALTERA offers high-performance, high-volume industrial big data analytics platforms for production control, smart manufacturing and automated mining of semiconductor manufacturing and test data. It is focused on providing observability, traceability and control across complex world-wide production operations leading to manufacturing excellence, world-class quality and yields, and accelerated product ramp-up, at considerable cost reductions. Its big data platforms process the test and manufacturing data of tens of millions of wafers and billions on parts every year. Qualtera is an ISO 9001 and ISO 27001 certified company, operating worldwide at major fabless companies, IDMs, foundries and OSATs.

Abstract

The ecosystems to produce SOC' s, and to an increasing extent integrated multi-chip modules, are becoming more complex and generate increasingly high volumes of manufacturing and test data to be stored and analysed. On the other hand, there is also an increasing need for improved manufacturing control, traceability, supply chain observability, and real-time monitoring and control in order to prevent and control quality and yield and productivity issues. Recent developments in data collection technologies, high-performance big data analytical engines (BDA engines) and machine learning methods have enabled drastic changes in the way such operational challenges can be managed and how rapidly and effectively day-to-day operational issues can be addressed. Whereas in the past manual ad-hoc, lengthy data analysis by specialists with high domain knowledge was the norm, nowadays much of the data analytics use cases, and even the resulting actions, can be fully automated and therefore are executed on extremely high data volumes systematically with a much lower probability of escapes.

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This presentation discusses a large-scale industrial implementation of such a BDA system across a very high-volume global manufacturing ecosystem. Such systems collect manufacturing and test data from the entire electronics supply chain and, in real-time, hundreds of algorithms are executed to produce analytical results, reports, alerts and control signals that are automatically fed down-stream and up-stream in the supply chain to improve the critical operational KPIs. We discuss use cases, benefits and the related technical and business challenges.

Keywords—Smart Manufacturing, Industry 4.0, big data analytics, machine learning, operational intelligence, test and manufacturing data analysis, data mining, yield, quality, real-time data collection, industrial Internet.